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PAVEMENT MANAGEMENT UPDATE FISCAL YEAR 1985-1986



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CITY AND COUNTY OF
SAN FRANCISCO

DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING

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PAVEMENT MANAGEMENT CONDITION SURVEY

FISCAL YEAR 85-86

EXECUTIVE SUMMARY

INTRODUCTION

In 1984, the Department of Public Works developed a Pavement Management System (PMS) designed to identify streets which needed maintenance, estimate the cost of maintenance, and establish a logical framework for determining priorities in street paving. The City of San Francisco has 849.9 miles of streets which the City maintains. This represents approximately 201,000,000 square feet of pavement. At an estimated replacement cost of \$8.00 per square foot, the streets of San Francisco are worth approximately \$1.6 billion.

Under the Pavement Management System, the condition of half of all City streets is surveyed each year. This report describes the survey which was completed in June, 1986, and covered primarily the southeastern part of the City. As part of this update, data for 2,607 additional street segments was added. PMS now contains information on 98.99% of the City's streets.

PAVEMENT MANAGEMENT SYSTEM FINDINGS

Because of fiscal constraints, San Francisco has been spending less on street maintenance each year than is needed to keep the streets in good condition. The City should be spending \$13.7 million per year. Actual expenditures as shown on the enclosed chart have been significantly lower. As a result, the City has 4,589 street segments which require

renovation at an estimated cost of \$84,742,000. This problem will become worse in the near future as the amount of money available for street renovation drops from \$11.1 million in FY 85-86 to approximately \$4.0 million in FY 87-88.

RECENT SUCCESSES

The \$19 million spent on City streets in the last two fiscal years was the largest two year expenditure in the last ten years and kept City streets from deteriorating further. New controls on utility trenches and railroad tracks helped improve the ride quality of City streets. The Pavement Management System also reduced the annual paving need by improving paving priorities.

FUTURE EFFORTS

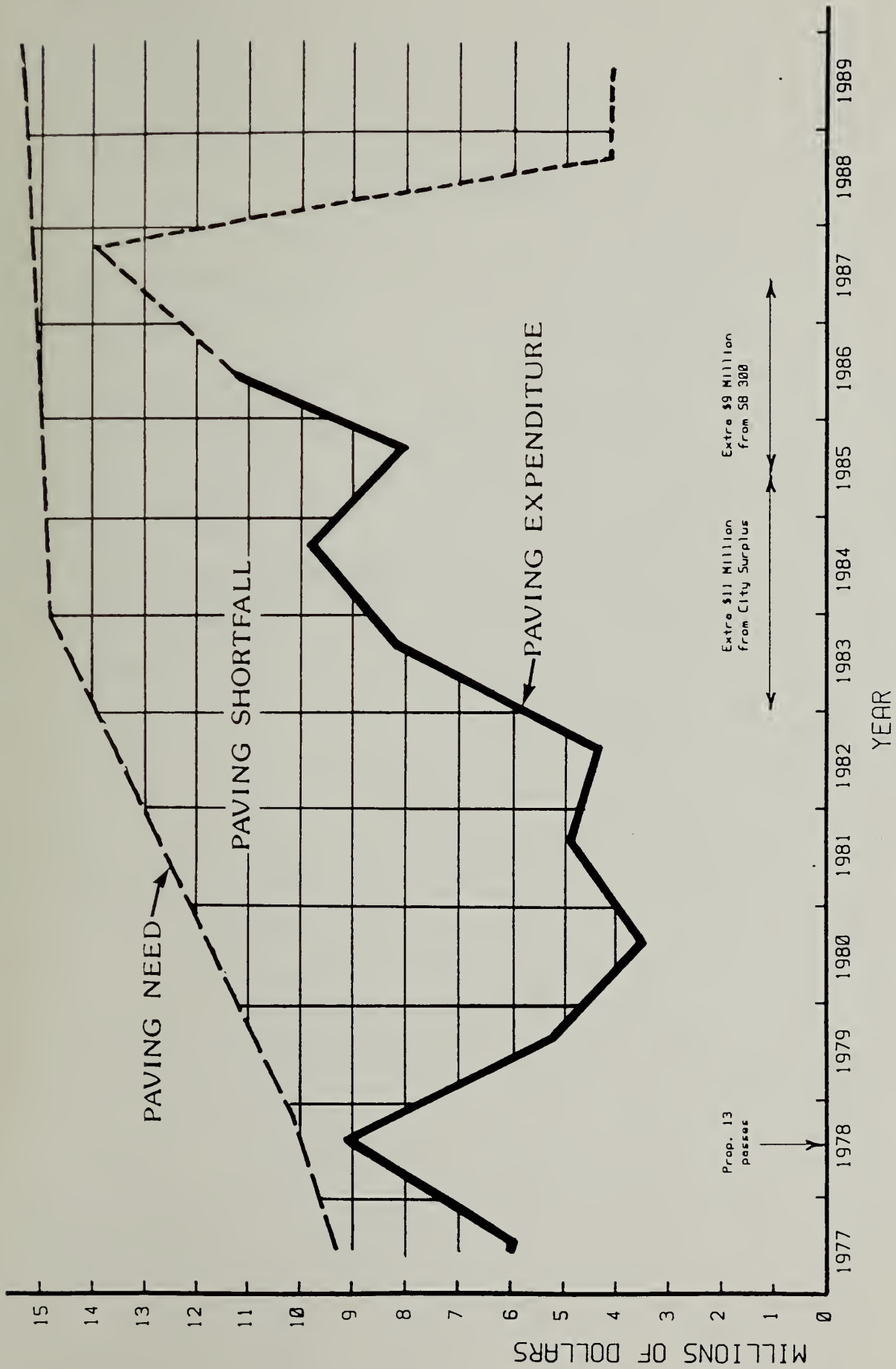
The formula governing annual need is

$$\frac{201,000,000 \text{ sq ft}}{18 \text{ year life}} \times \$1.23/\text{sq ft} = \$13.7 \text{ million}$$

To reduce this cost, we must extend pavement life and/or reduce paving costs. Studies are underway to find methods of extending pavement life. Paving cost is being reduced by renovating the City's asphalt plant, the only one remaining in San Francisco. In addition, new fund sources will have to be found to make up the shortfall between needs and available funds.

CONCLUSIONS AND RECOMMENDATIONS

San Francisco needs to spend \$13.7 million per year on street renovation to keep existing pavement from deteriorating. Although funds provided in the last two years significantly slowed the rate of deterioration, a method must be found to increase the paving dollars in FY 87-88 above the currently programmed \$4.0 million. Additional funds must also be found to reduce the \$84,742,000 paving backlog.



COMPARISON OF PAVING NEED WITH ACTUAL EXPENDITURES



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INTRODUCTION

In 1984, the Department of Public Works developed a Pavement Management System (PMS) to identify streets which needed maintenance, estimate the cost of maintenance, and establish a logical framework for determining priorities in street paving.

City streets fall into three maintenance categories:

- Dedicated/unpaved/unaccepted. These streets have been legally dedicated for public use, but have not been accepted for maintenance by the City. Maintenance is the responsibility of the fronting property owners.
- Dedicated/paved/unaccepted. Same as above, except the streets were paved by private parties and are maintained by the fronting property owners.
- Dedicated/paved/accepted. These streets were paved to City standards by private parties. Work was inspected by the City, which then accepted the street for maintenance.

Most City streets fall into the last category. The City now maintains 849.9 miles of city streets. This represents approximately 201,000,000 square feet of pavement. At an estimated replacement cost of \$8.00 per square foot, the streets of San Francisco are worth approximately \$1.6 billion.

Under the Pavement Management System, half of the city streets are surveyed each year. This report describes the survey which was completed in June, 1986, and covered primarily the southeastern part of the City. As part of this update, data for 2,607 additional street segments was added. PMS now contains information on 98.99% of the City's streets.

WHAT IS PAVEMENT MANAGEMENT?

Background

Prior to development of the Pavement Management System, there was no systematic method of determining which streets needed to be maintained or when maintenance should be performed. Keeping track of the condition of 12,260 street segments* was not possible without a computer. Therefore, selection of streets to be paved was based on recommendations of street maintenance personnel and complaints from the public and elected officials.

This system worked well when enough Gas Tax funds and property tax money was available to keep up with paving needs. However, property tax money is now being used for other needs; Gas Tax revenues have decreased as smaller cars use less gasoline; and the price of asphalt has increased by over 300% in the last ten years.

Like many other government functions, street maintenance personnel have been asked to do more with less.

Pavement Deterioration

In order to understand what a PMS does, it will be useful to take a quick look at the nature of the pavement itself. Most of our heavily travelled streets have a concrete base and an asphalt concrete wearing surface.

* A "street segment" is generally a city block except on wide streets such as Geary Boulevard where a segment is one side of a block.

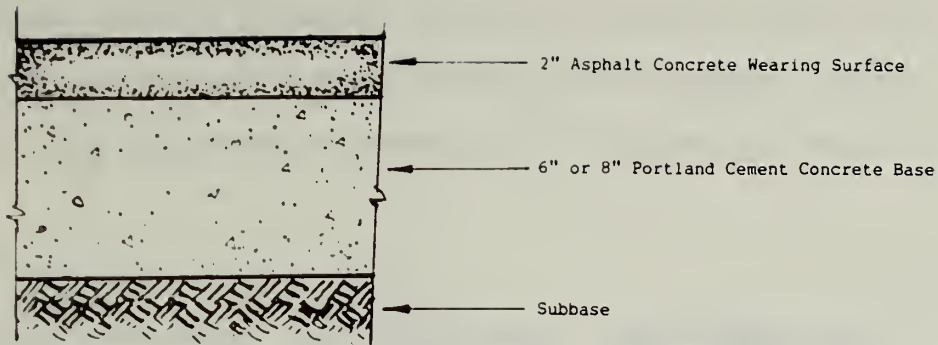


FIGURE 1. PAVEMENT CROSS SECTION FOR MAJOR STREETS

The asphalt acts like the paint on a house - proper maintenance of the paint will preserve the structure. An asphalt surface in good condition allows the concrete to last indefinitely. PMS has been designed to get the most out of the asphalt while avoiding damage to the concrete. This not only gives a better ride, but saves money, since a layer of asphalt is many times cheaper to replace than reconstructing the concrete.

Asphalt pavement has a useful life limited by two main factors: the quality of the initial construction and the external stress it receives from weather and traffic. Asphalt, like paint, gradually hardens over its lifetime. Its serviceability is limited to that part of the hardening process between its being firm enough to bear weight and its becoming too brittle to flex readily under load. External stress is chiefly caused by weather, ground movement, street excavation and traffic. Passing vehicles pound away at the pavement with impact loads of several tons. Water and corrosive solvents dripping from vehicles erode the asphalt to produce pitted areas at intersections and along the centers of traffic lanes. Traffic loads also cause their own

characteristic cracking patterns. Cracking eventually reaches down to the concrete base and admits water between the two layers. Traffic running over the trapped water hammers on the concrete and shatters it.

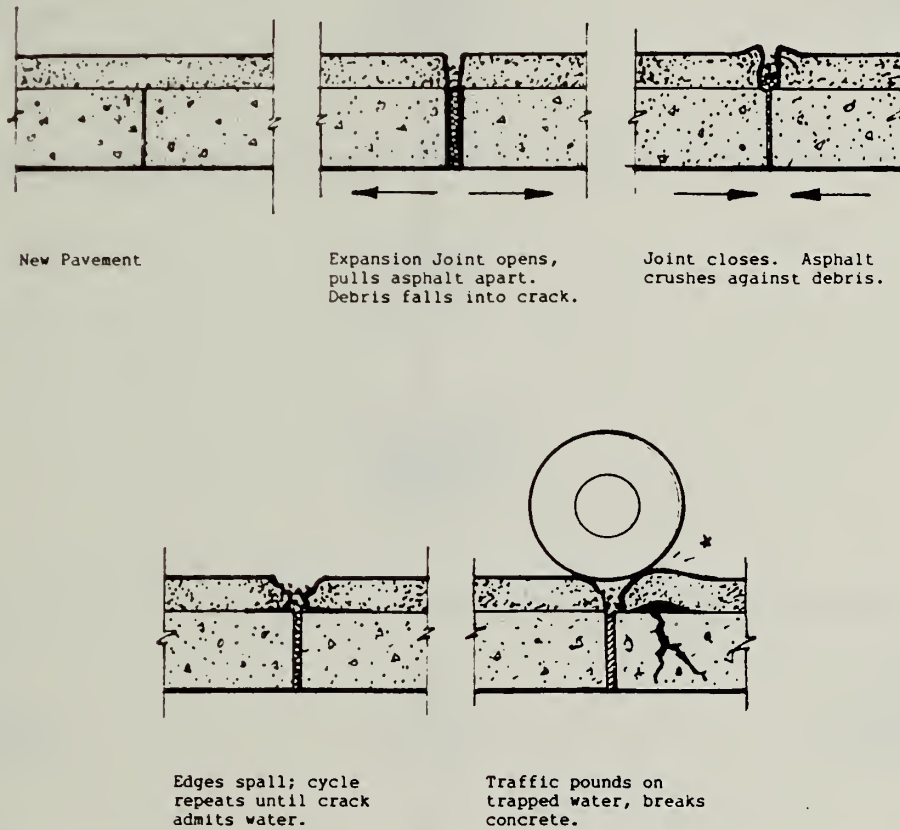


FIGURE 2. EXPANSION JOINT CRACKING CYCLE



San Francisco's Pavement Management System

San Francisco's Pavement Management System works as shown in Figure 3.

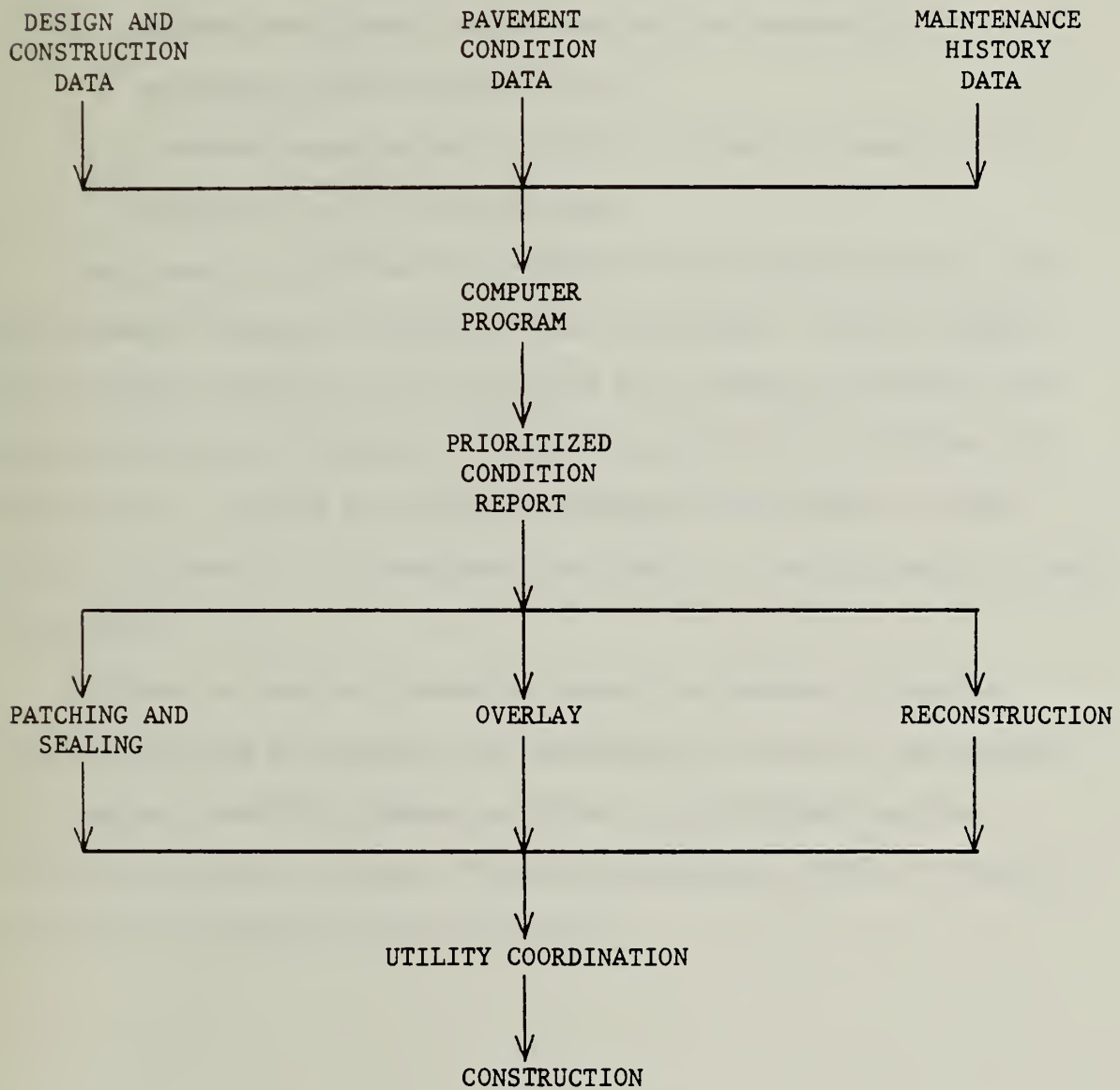


FIGURE 3. SAN FRANCISCO'S PAVEMENT MANAGEMENT SYSTEM

PMS contains three major sets of data:

1. Design and Construction Data - name of street segment, cross streets, street classification, type of pavement, area of acceptance for maintenance, traffic volumes, etc.
2. Maintenance History Data - when and how pavement was maintained, year last paved, etc.
3. Pavement Condition Data - rating of street in terms of ride quality, cracking and ravelling.

The design and construction data and the maintenance history data were gathered from many different files and records. Not all streets have complete information and only those that passed the validity edit were entered into the computer. Pavement condition data includes the ride quality, cracking and ravelling ratings of the roadway. These ratings are based on the smoothness and comfort of the ride and on visual inspection.

All data is funneled through a computer to generate a list of streets requiring maintenance. In determining the need for maintenance, the computer considers pavement condition, type of street use and presence or absence of buses. The selection logic is shown in Figure 4, which has been modified from prior years.

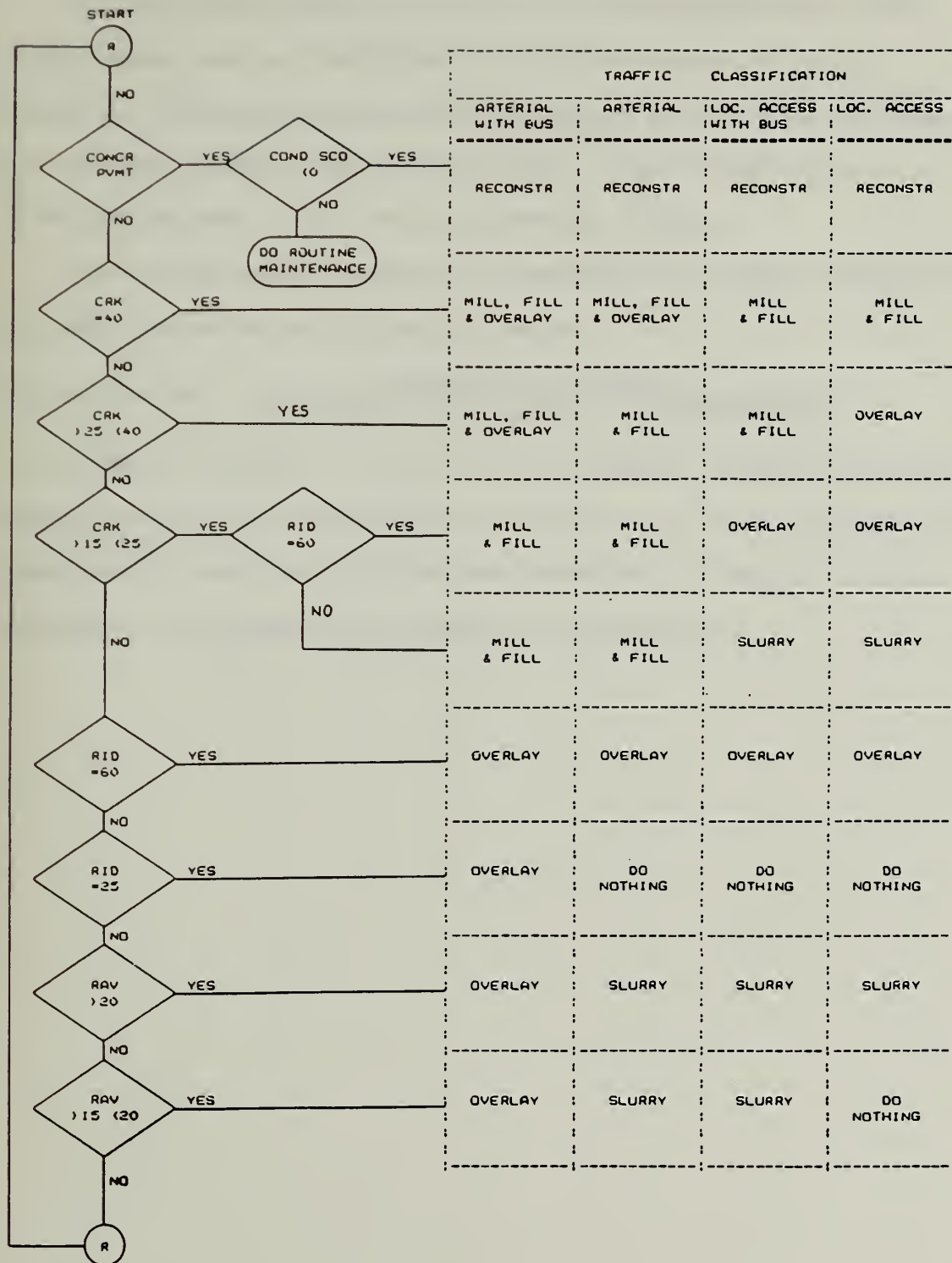


FIGURE 4. REHABILITATION SELECTION LOGIC

In prior years, because of the lack of street maintenance funds, reconstruction was not considered as an option because it was too expensive. This year, reconstruction was added as an option to provide a more accurate picture of maintenance needs. This resulted in a \$2,492,200 increase in the street maintenance backlog.

Once a maintenance treatment is identified, the streets selected are prioritized based on the following formula:

$$\text{Priority Rating} = \frac{\text{Average Daily Traffic}}{\text{Unit Cost of Maintenance X Condition Score}}$$

As shown in Figure 3, lists of street segments requiring patching, sealing, overlays or reconstruction are sent to the various utilities for coordination. Once the utilities have corrected any defects in their facilities, the segments are released for construction.

PAVEMENT MANAGEMENT SYSTEM FINDINGS

1. Because of fiscal constraints, San Francisco has been spending less on street maintenance each year than is needed to keep them in good condition.

A Public Works study performed in 1984 showed that major streets were being resurfaced approximately every eighteen years. The average cost of paving is \$1.23 per square foot. Therefore, the annual amount the City should spend on paving is:

$$\frac{201,000,000 \text{ sq ft}}{18 \text{ years}} \times \$1.23/\text{sq ft} = \$13.7 \text{ million}$$

Figure 5 shows the amounts the City should have spent on paving each year compared to what was actually spent. Actual expenditures were close to needs until Proposition 13 passed in June, 1978. Paving needs were neglected from 1978 until 1983, when two supplemental appropriations totalling eleven million dollars were provided from the City's General Fund surplus. An additional nine million dollars became available in 1985 and 1986 from Senate Bill 300 (Foran). These funds must be expended by June 30, 1987. After June 30, 1987, the amount available will drop dramatically.

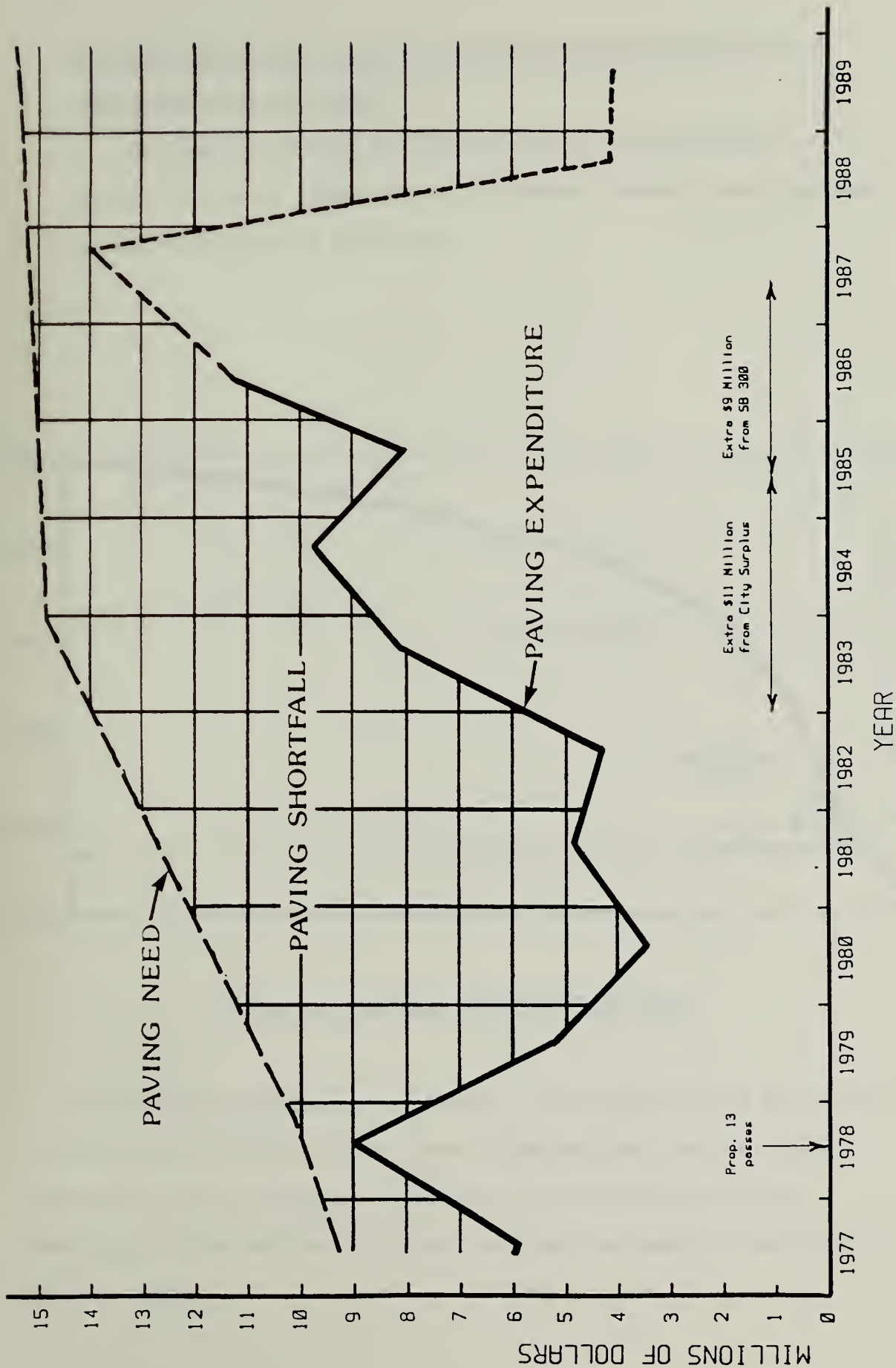


FIGURE 5. COMPARISON OF PAVING NEED WITH ACTUAL EXPENDITURES

2. Deferring street maintenance increases the amount which will eventually have to be paid.

The American Public Works Association, in a publication entitled "Pavement (Maintenance) Management Systems", described how pavements deteriorate with time:

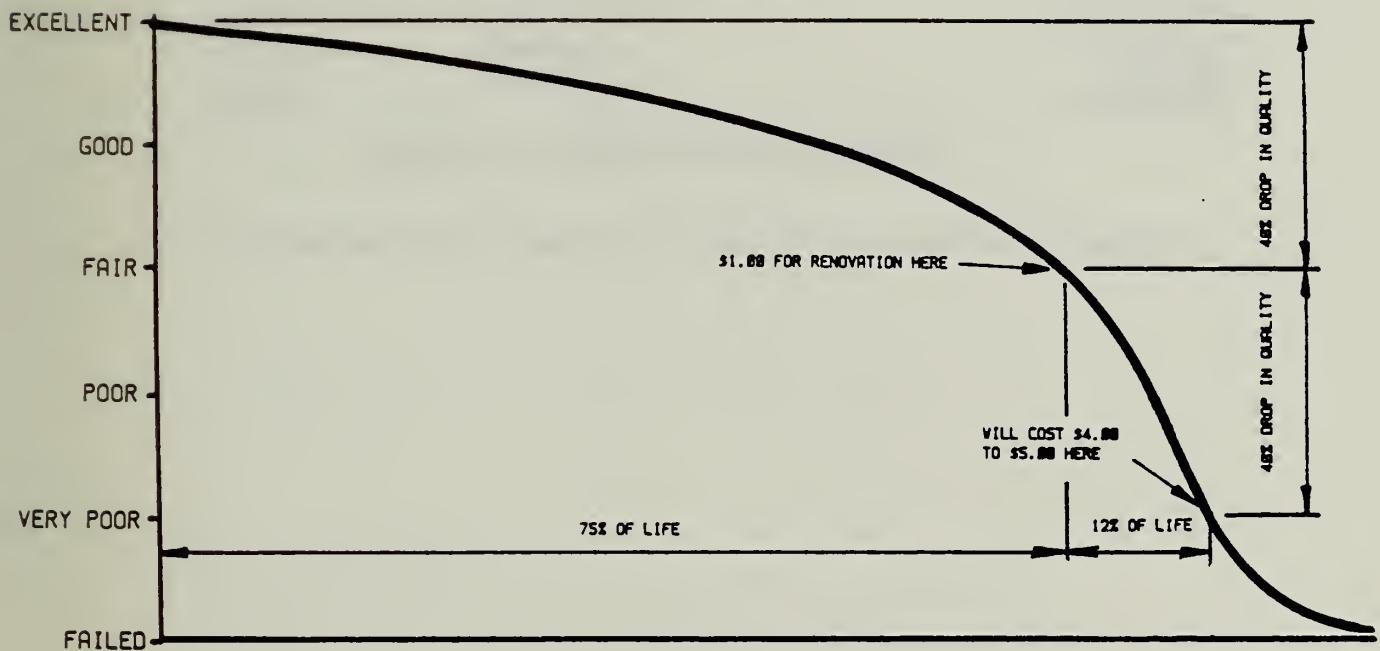


FIGURE 6. PAVEMENT DETERIORATION CURVE

Initial deterioration is very slow, as the quality drops by only 40% in the first 75% of life. After that, deterioration and the related maintenance costs accelerate quickly over a short period of time. Deferring \$1.00 of maintenance merely requires tax payers to pay \$5.00 in the near future.

3. Deferred maintenance has resulted in a backlog of \$84,742,000 in street renovation needs.

The latest PMS findings have identified 4,589 street segments which require renovation as follows:

| <u>Number of Segments</u> | <u>Maintenance Treatment</u> | <u>Estimated Cost</u> |
|-------------------------------|----------------------------------|---------------------------|
| 25 | Reconstruction | \$ 2,492,000 |
| 704 | Mill, Fill & Overlay | 24,541,000 |
| 1,593 | Mill & Fill | 36,730,000 |
| 1,352 | Overlay | 19,229,000 |
| 915 | Slurry Seal | 1,750,000 |
| <u>4,589</u> | | <u>\$ 84,742,000</u> |

FIGURE 7. STREET RENOVATION BACKLOG

A map showing streets needing renovation is included in Appendix 1.

RECENT SUCCESS STORIES

1. The condition of City streets has declined only slightly during the last two years.

In the last two fiscal years, the city spent \$19 million on street maintenance. This is less than needed, but more than was spent in any two year period in the last ten years. The results are shown in Figure 8.

Although the average condition of City streets declined slightly, the number of street segments in "Good" condition increased from 3,905 to 5,766. Funds must now be found to keep "Fair/Poor" streets from failing and to renovate "Failed" streets.

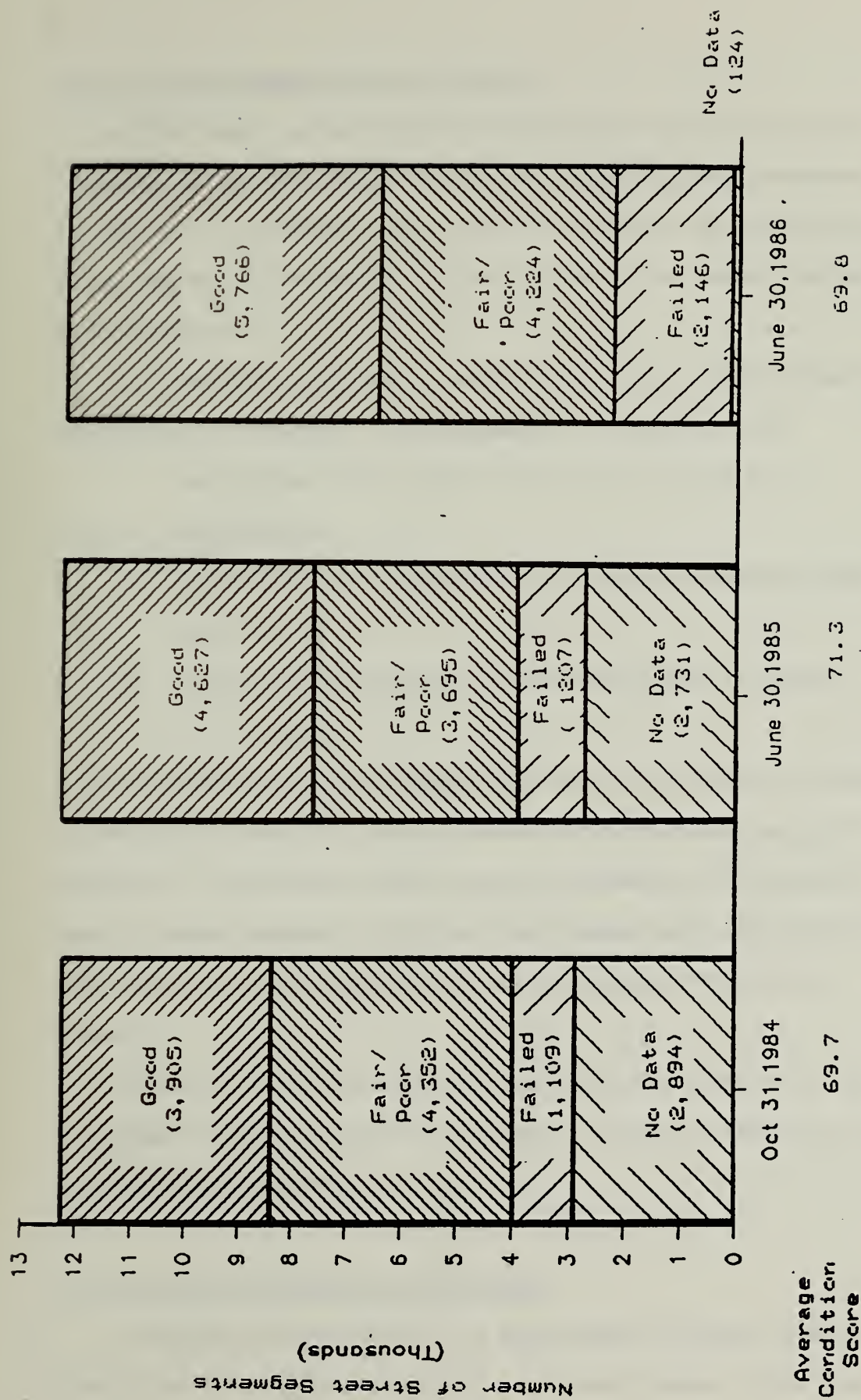


FIGURE 9. PAVEMENT CONDITION CHANGES

2. Utility trench restoration has improved.

A 1984 study revealed that 51% of street segments had poorly restored utility trenches. The cost of repairing these trenches was estimated at \$27,000,000. Poor trench restoration translated into a rough ride which frequently resulted in the street being resurfaced at City expense.

As a result of the study, control over utility excavations was significantly tightened. New legislation was passed which:

1. Established strict rules for trench excavation and restoration.
2. Allowed DPW to reconstruct poor trenches and charge the utility.
3. Allowed DPW inspectors to fine contractors for poor performance.

Improvement in trench restoration has been dramatic. A recent survey showed only 3% of streets paved three years ago had poor trenches. In FY 85-86, street inspectors issued 2,682 notices to repair roadway defects. Utilities have become very cooperative in both improving trench restoration and correcting the defects promptly.

As part of the next condition survey, street inspectors will once again focus on defective trenches in order to improve the ride quality of City streets.

3. Railroad track problems are decreasing.

Railroads are responsible for maintaining pavement between tracks and for two feet on each side of their tracks. This area has

long been a problem, as railroads did not want to put money into facilities they were considering abandoning.

Thanks to assistance from the City Attorney's Office, a system was worked out in which DPW, as part of street renovation, would remove abandoned railroad tracks and be reimbursed by the railroad or by the owner of the spur track. As a result, approximately 9,300 feet of railroad tracks were removed on North Point Street, Seventh Street, and other streets in the last two years.

4. PMS has saved money.

Prior to development of PMS, street segments were selected for paving based on observations and recommendations of various DPW personnel, citizens and elected officials. No uniform structure existed for inspection of the 12,260 street segments. As a result, residential streets were being paved every 14.2 years, compared to 17.8 years for major arterials. Clearly, residential streets were being paved too often.

Implementation of PMS has resulted in a systematic, organized approach to pavement maintenance. Use of computers has allowed us to track the condition of each segment and determine the optimum maintenance treatment based on the observed conditions.

Delaying paving of residential streets from 14.2 years to 17.8 years allowed paving of 25.4% more streets for the same amount of money. This translates to an annual savings of \$644,000.

FUTURE EFFORTS

1. Decrease annual paving needs.

The formula governing annual paving need is

$$\frac{201,000,000 \text{ sq ft}}{18 \text{ year life}} \times \$1.23/\text{sq ft} = \$13.7 \text{ million}$$

This amount can be decreased by increasing the 18 year life of paving and/or reducing the \$1.23/sq ft cost of paving.

If paving life could be extended by one year, this equation would become:

$$\frac{201,000,000 \text{ sq ft}}{19 \text{ years}} \times \$1.23/\text{sq ft} = \$13.0 \text{ million}$$

This is a saving of \$700,000 per year. To determine if the time between maintenance treatments can be extended, a section of Geary Boulevard was paved in 1983 using nine different treatments. This section is monitored annually to see how fast it deteriorates. Once we know how long each treatment lasts, we can compare it with the cost of that treatment to determine which treatment is most cost effective.

2. Increase pavement life

a. The study which showed that major City streets were paved every 18 years measured how frequently streets were actually paved, not how frequently they should be paved.



The APWA curve shown in Figure 6 is a general curve. The specific shape of the curve and the time at which the curve starts to break sharply downward will vary for each region and type of pavement. Knowing the shape of the curve(s) for San Francisco will provide a better estimate for how frequently streets should be paved to maximize cost effectiveness. A consultant has now been hired to develop curves for San Francisco to improve our ability to plan preventive maintenance.

b. One of the major causes of street failure is the failure of subsurface facilities such as sewers, water lines, and utilities. With age, small cracks or holes appear in sewer lines. Over the years, sand sifts into these holes creating voids under pavement. Although sewers are inspected before streets are paved, it is extremely difficult to detect these voids. Once the voids become substantial, the pavement sags into the hole and the street fails.

Several consultants have proposed methods to detect these subsurface voids using infrared thermography, radar and other methods. These methods are now being investigated. If any of them prove valid, we will be able to dig up and fill these voids before paving, thus extending pavement life.

3. Decrease paving costs.

a. A 1984 study of paving costs showed that paving by City forces was 12-30% cheaper than paving done by contract, primarily because of reduced administrative requirements. The City should take advantage of this savings by adding a second paving crew. Adding a second crew will be proposed as part of the FY 87-88 budget request.

b. The City has the only asphalt plant remaining within the City limits. Contractors must now buy their asphalt concrete from plants in South San Francisco and the East Bay and transport them to City jobs. These transportation costs result in higher paving costs.. In FY 86-87, \$200,000 was appropriated for renovation of the City's asphalt plant. Once this renovation is completed, legislation will be introduced to the Board of Supervisors which would allow sale of asphalt concrete to contractors for use on City streets. This should reduce paving costs.

4. Obtain additional funds.

Despite all the efforts and improvements described above, the fact remains that the City must find a way to spend more money on City streets. At present, it appears that fiscal constraints will reduce street paving to \$4.0 million for FY 87-88 compared to a \$13.7 million need. Options currently available to generate more funds include:

- Increase state aid. Although the current administration opposes tax increases and the Gann Initiative limits state spending, a state bond issue is being considered. This issue should be monitored to see if money can be included for cities and counties.
- Increase the sales tax. Legislation has been passed authorizing Bay Area counties to raise the sales tax 1/2¢ for transportation purposes. Alameda and Santa Clara Counties have already voted to increase their sales taxes.
- Issuing General Obligation Bonds to pay for the paving backlog.

CONCLUSIONS AND RECOMMENDATIONS

- San Francisco has a backlog of \$84,742,000 in paving needs.
- San Francisco needs to spend \$13.7 million per year on street renovation.
- Funds provided during the last two years kept City streets from deteriorating further.
- Additional funds must be found for FY 87-88 to preserve the condition of City streets.
- A fund source must be found to eliminate the street renovation backlog.

ACKNOWLEDGMENTS

| | |
|---------------------|---|
| Vitaly B. Troyan | Chief, Bureau of Engineering |
| Rich Cunningham | Superintendent, Bureau of Street & Sewer Repair |
| Kingsley Roberts | Superintendent of Street Repair |
| Gordon M. Wong | Division Engineer, Streets & Highways |
| Tim A. Molinare | Assistant Division Engineer, Streets & Highways |
| Stephen P. Wong | Section Engineer, Street Planning |
| David Leo | Project Manager |
| Joe Norris | Civil Engineering Associate |
| John Giorgi | Street Inspection Supervisor |
| Cynthia Chono | Street Inspector |
| Walter Hoo | Street Inspector |
| Carl Lee | Street Inspector |
| Mauricio Montenegro | Street Inspector |
| Kathy Foley | Deputy City Attorney |



APPENDICES



GOLDEN GATE



MAP

Appendix 1.

OF THE
CITY AND COUNTY OF

SAN FRANCISCO

DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING

Fiscal Year 1985-1986

Sewerage Management System
Rehabilitation Candidatesof
itesTreatment
RequiredEstimated
Cost

reconstruction

\$ 2,492,000

mill, fill, overlay

24,541,000

mill, fill

36,730,000

overlay

19,229,000

slurry seal

1,750,000

total candidates

\$84,742,000

PACIFIC OCEAN

SACRAMENTO RIVER



GOLDEN GATE



MAP

Appendix 1.

OF THE
CITY AND COUNTY OF

SAN FRANCISCO

DEPARTMENT OF PUBLIC WORKS

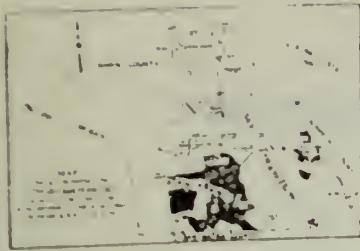
BUREAU OF ENGINEERING

Fiscal Year 1985-1986

Pavement Management System
Rehabilitation Candidates

| Number of Candidates | Treatment Required | Estimated Cost |
|-------------------------|-----------------------|-------------------|
| 25 | reconstruction | \$ 2,492,000 |
| 704 | mill, fill, overlay | 24,541,000 |
| 1,593 | mill, fill | 36,730,000 |
| 1,352 | overlay | 19,229,000 |
| 915 | slurry seal | 1,750,000 |
| 4,589 | total candidates | \$84,742,000 |

PACIFIC OCEAN



GOLDEN GATE



MAP

Appendix 2.

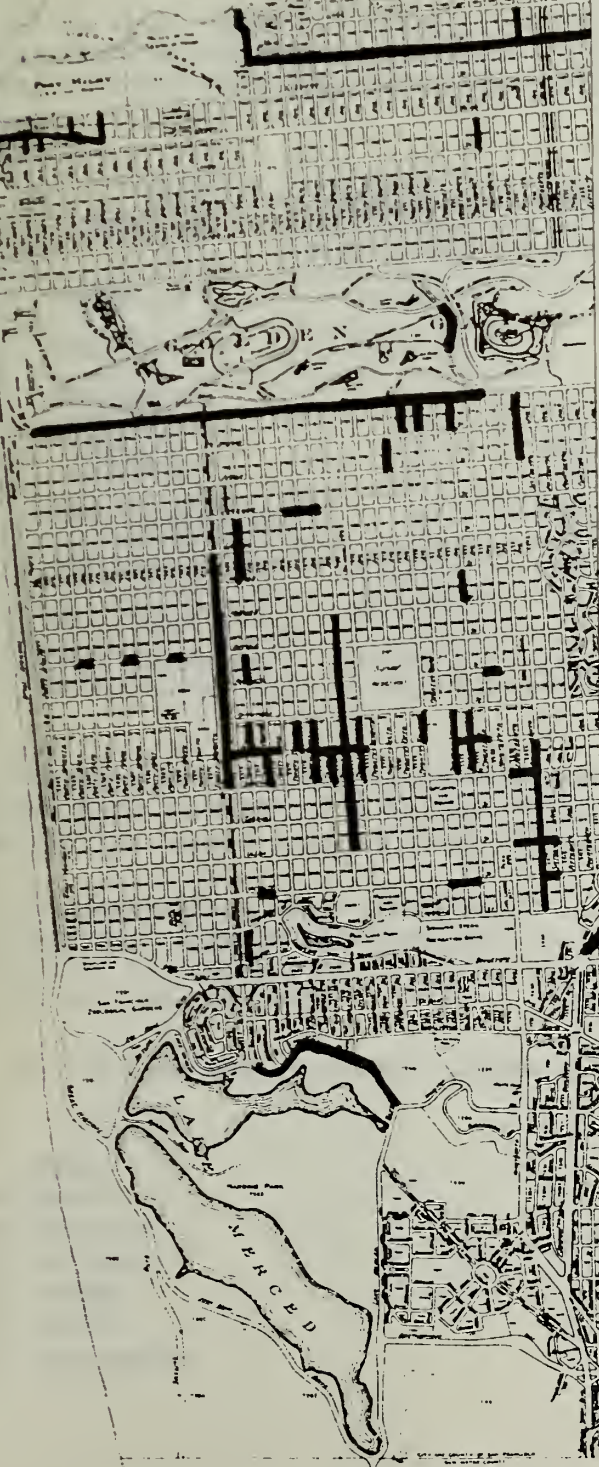
OF THE
CITY AND COUNTY OF

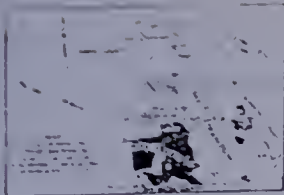
SAN FRANCISCO

DEPARTMENT OF PUBLIC WORKS
BUREAU OF ENGINEERING

Streets Paved in 1985-1986

PACIFIC OCEAN





GOLDEN GATE



U.S. MILITARY RESERVE

MAP

OF THE

CITY AND COUNTY OF

SAN FRANCISCO

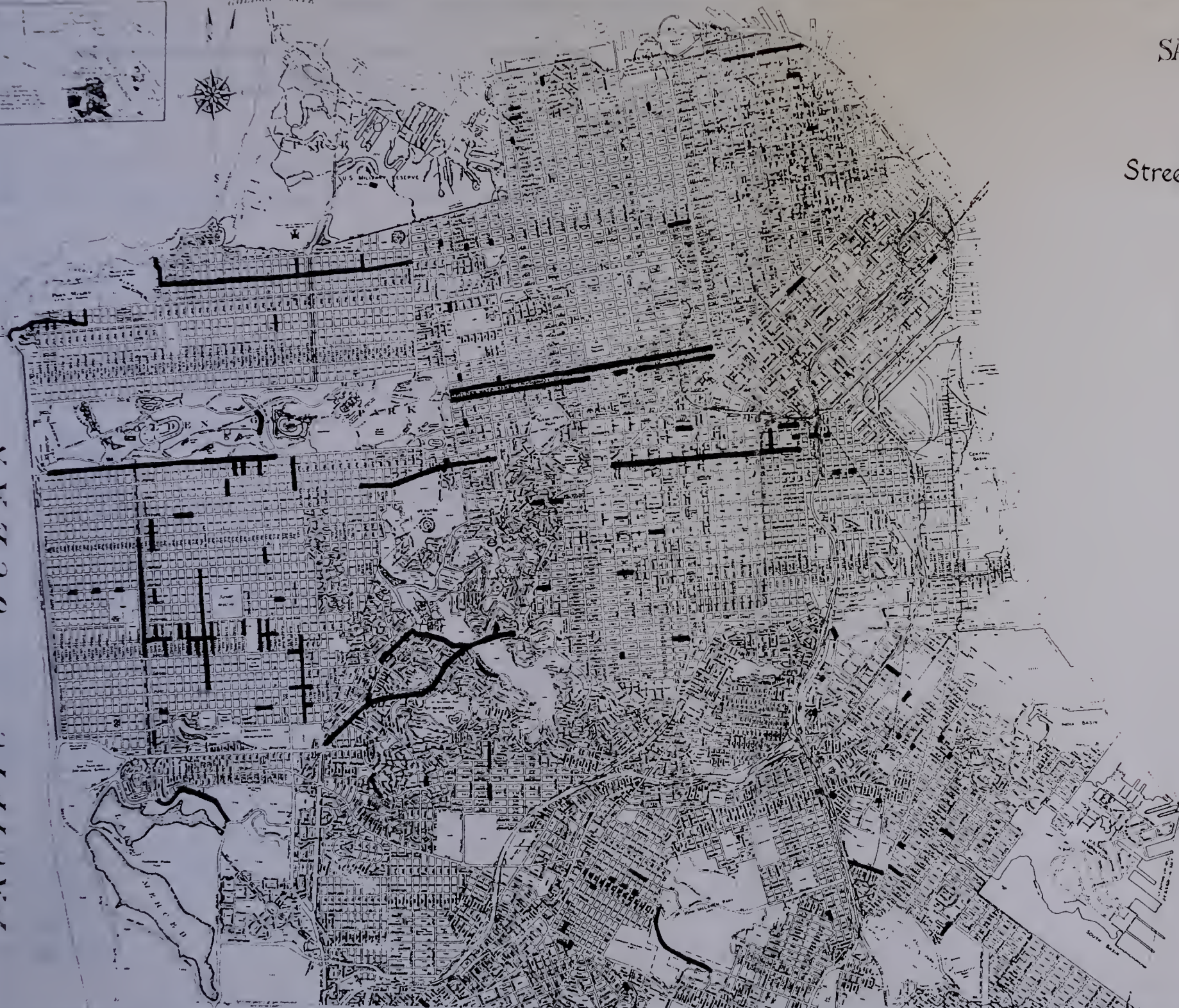
DEPARTMENT OF PUBLIC WORKS

IN REPLY TO 1240-11 R100

Appendix 2.

Streets Paved in 1985-1986

PACIFIC OCEAN



DEPARTMENT OF PUBLIC WORKS

INTER-BUREAU MEMO

TO: Nelson Wong, BOE-Project Management Section DATE: September 16, 1986

FROM: Julie Lee, OFFMA-Financial Management & SUBJECT: SB300 Status Report for
Budget Section Fiscal Year-End 1985-86

Below is a summary of Fiscal Year-End 1985-86 MOE & SB300 Expenditures for Bureau of Engineering and Street Repair. For purposes of comparison, I have provided a column for SB300 Base-Year Maintenance of Effort FY 1984-85.

| TYPE OF WORK | STREET REPAIR | ENGINEERING | TOTAL | SB300 BASE-YEAR MAINT. OF EFFORT |
|----------------------|------------------|------------------|------------------|-------------------------------------|
| | FY 85-86 EXPEND. | FY 85-86 EXPEND. | FY 85-86 EXPEND. | FY 84-85 EXPEND. |
| PATCHING-MOE | 1,110,932.12 | -0- | 1,110,932.12 | 949,616.92 |
| OVERLAY-MOE | 1,854,173.08 | -0- | 1,854,173.08 | 1,895,111.80 |
| RECONSTRUCTION: | | | | |
| MOE FUNDS | -0- | 5,313,949.48 | 5,313,949.48 | 5,047,047.45 |
| SB300 FUND | -0- | 2,831,176.98 | 2,831,176.98 | -0- |
| ADJUSTMENTS | -0- | 29,757.94 | 29,757.94 | <21,689.69> |
| TOTAL RECONSTRUCTION | -0- | 8,174,884.40 | 8,174,884.40 | 5,025,357.76 |
| TOTAL INCLUDING [OH] | 2,965,105.20 | 8,174,884.40 | 11,139,989.60 | 7,870,086.48 |
| LESS: OVERHEAD COST | <339,295.45> | <323,159.79> | <662,455.24> | <527,008.11> |
| TOTAL SB300/MOE EXP. | 2,625,809.75 | 7,851,724.61 | 10,477,534.36 | 7,343,078.37 |

Attached are detailed worksheets showing BOE job orders covered under SB300 for Street Reconstruction for FY 1985-86 and for your information, a worksheet showing SSR job orders covered under Patching and Overlay for FY 1985-86.

Congratulations on a job-well-done in meeting the Maintenance of Effort for FY 1985-86. I guess our next goal is to meet the first SB300 allocation of \$3,441,422.87 by December 31, 1986. I will be sending out a SB300 Fund status report in mid January 1987.

If you have any questions, please give me a call.

cc: F. Chan
R. Small
G. Costanzo
R. Carlson
V. Troyan
S. Shoaf
R. Cunningham

REFERENCE TO COUNTY

SOURCE: PC REPORTS 104 & 305/FAMIS REPORT 62

PROGRAM: 2140 - STREET REPAIR

| CATEGORY/ACTIVITY/JOB ORDER | JOB ORDER | SB300 Base-Yr | Labor Expenditures | Non-Labor | Total Labor |
|--|-----------|---------------|--------------------|--------------|--------------|
| Prog/Act # | NUMBER | FY 84-85 EXP | Street Repair | Expenditures | & Non-Labor |
| OVERLAY | | | | | |
| Major Street Repairs | | | | | |
| - Resurfacing | 5951S | 769,478.45 | 309,127.67 | 75,020.03 | 649,772.28 |
| - Slurry Sealing | 5953S | 233,567.22 | 200,872.68 | 26,815.90 | 326,712.61 |
| - Road Support | 5954S | 362,871.31 | 180,537.52 | 50,017.92 | 319,679.30 |
| Program Support | | | | | |
| - A/C Materials [80%] | 5970S | 529,194.82 | 0.00 | 558,008.89 | 558,008.89 |
| Total Overlay including Overhead Cost | | 1,895,111.80 | 690,537.87 | 709,862.74 | 1,854,173.08 |
| PATCHING | | | | | |
| Minor Street Repairs | | | | | |
| - Patch Paving | 5955S | 574,440.55 | 506,873.33 | 43,972.04 | 706,051.47 |
| - Pothole Repair | 5956S | 178,638.28 | 115,976.36 | 10,509.07 | 201,541.07 |
| - Crack-Sealing | --- | 8,332.78 | 0.00 | 0.00 | 0.00 |
| Program Support | | | | | |
| - A/C Materials [20%] | 5970S | 132,298.70 | 0.00 | 139,502.22 | 139,502.22 |
| - Slurry Materials | 5971S | 55,906.61 | 0.00 | 63,837.36 | 63,837.36 |
| Total Patching including Overhead Cost | | 949,616.92 | 622,849.69 | 257,820.69 | 1,110,932.12 |
| Total Overlay & Patching Incl. OH Cost | | 2,844,728.72 | 1,313,387.56 | 967,683.43 | 2,965,105.20 |
| Less: Overhead Cost | | -270,623.68 | -205,852.03 | 0.00 | -339,295.45 |
| TOTAL OVERLAY & PATCHING EXCL. OH COST | | 2,574,105.04 | 1,107,535.53 | 967,683.43 | 2,625,809.75 |

| J.O.# | JOB ORDER DESCRIPTION | START DATE | COMP DATE | SOURCE FG/E I PROJ | OPERATING FG/E I PROJ | SOURCE DESCRP | EXPENDED FY 85/86 | CONTRACT COST | LABOR COST | OTHER COST |
|-------|--------------------------------------|------------|-------------|-----------------------|--------------------------|------------------|----------------------|------------------|---------------|---------------|
| 5300E | GEARY BLVD, TEST SEC. | 09-14-82 | IN PROGRESS | 02/0911203 | 06/5041360 | GTZ | 27,663.95 | 5,290.47 | 12,035.46 | 10,338.02 |
| 5395E | ELSI ST WIDENING | 03-20-80 | IN PROGRESS | 02/0911248 | 06/5041395 | GTZ | 334,325.38 | 287,200.00 | 47,125.38 | 0.00 |
| 5495E | BAY, FILLMORE TO EMBARCADERO CT7 | 01-10-86 | " | 01/0011321 | 01/0011321 | GF | 12,631.59 | 12,631.59 | 0.00 | 0.00 |
| 5540E | 7TH ST, MARKET-BRANNAN SR-CT1A | 06-14-83 | " | 01/0011321 | 01/0011321 | GF | 22,604.62 | 22,604.62 | 0.00 | 0.00 |
| 5582E | DIVISADERO, WALLER-SACRAMENTO SR CT9 | 08-19-83 | " | 01/0011321 | 01/0011321 | GF | 28,562.19 | 28,562.19 | 0.00 | 0.00 |
| 5583E | GEARY BLVD, 44TH AVE-WOOD SR CT10 | 10-17-85 | " | 01/0011321 | 01/0011321 | GF | 75,221.37 | 70,575.90 | 0.00 | 4,645.47 |
| 5584E | O'FARRELL, GEARY-POST SR CT11 | 08-19-83 | " | 01/0011321 | 01/0011321 | GF | 4,452.32 | 0.00 | 0.00 | 4,452.32 |
| 5586E | GUERRERO ST RESURFACING | 08-19-83 | " | 01/0011321 | 06/5041586 | GF | 2,352.21 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 02/0911301 | " | FAU | 14,717.59 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 06/5041586 | " | " | 17,069.80 | 17,055.72 | 0.00 | 14.08 |
| 5631E | SLOAT/WOODSIDE (FA-8) | 11-25-83 | " | 02/0911244 | 06/5041631 | GTZ | 8,929.94 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 02/0911301 | " | GTZ | 5,309.38 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 06/5041631 | " | FAU | 14,129.35 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 32/0011000 | " | WD | 763.96 | 0.00 | 0.00 | 0.00 |
| 5632E | NAPLES/PALOU (FA-9) | 11-25-83 | " | 02/0911244 | 06/5041632 | GTZ | 29,132.63 | 16,837.00 | 3,942.79 | 8,352.84 |
| " | " | " | " | 02/0911301 | " | GTZ | -1,681.29 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 06/5041632 | " | FAU | 21,432.72 | 0.00 | 0.00 | 0.00 |
| 5633E | HYDE/LEAVENWORTH (FA-10) | 11-25-83 | " | 02/0911244 | 06/5041633 | GTZ | 0.00 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 02/0911301 | " | GTZ | -6,340.84 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 06/5041633 | " | FAU | 49,443.27 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 32/0011000 | " | WD | 0.00 | 0.00 | 0.00 | 0.00 |
| 5678E | FLORIDA ST WIDENING | 04-09-83 | " | 02/0911863 | 06/5041678 | GTZ | 41,102.43 | 25,795.31 | 5,604.00 | 9,703.12 |
| 5695E | NORTH PT ST CT-14 | 06-08-84 | IN PROGRESS | 01/0011321 | 01/0011321 | GF | 130,646.67 | 112,757.27 | 14,875.39 | 3,014.01 |
| " | " | " | " | 01/0011321 | 06/5041695 | GF | 13,626.04 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 02/3521695 | " | SE | 783,328.54 | 0.00 | 0.00 | 0.00 |
| 5696E | PARNASSUS AVE. (FA-13) | 06-08-84 | " | 01/0011321 | 06/5041696 | GF | 796,954.58 | 722,165.00 | 73,854.02 | 935.56 |
| " | " | " | " | 02/0911301 | " | GTZ | 165.36 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 06/5041696 | " | FAU | 48,373.99 | 0.00 | 0.00 | 0.00 |
| 5697E | FELL ST (FA-29) | 06-08-84 | IN PROGRESS | 01/0011321 | 01/0011321 | GF | 241,122.64 | 248,710.29 | 34,337.28 | 6,614.42 |
| " | " | " | " | 01/0011321 | 06/5041697 | GF | 289,661.99 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 06/5041697 | " | FAU | 12,890.57 | 0.00 | 0.00 | 0.00 |
| 5698E | 16TH ST (CT-17) | 06-08-84 | IN PROGRESS | 01/0011321 | 01/0011321 | GF | 389,846.96 | 418,050.00 | 57,791.68 | 980.46 |
| " | " | " | " | 01/0011321 | 06/5031698 | GF | 476,822.14 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 02/4501300 | " | SB300 | 1,474.90 | 0.00 | 0.00 | 0.00 |
| 5699E | OAK ST (CT-18) | 06-08-84 | " | 01/0011321 | 01/0011321 | GF | 10,146.84 | 0.00 | 0.00 | 0.00 |
| 5702E | CALIFORNIA ST (FA-12) | 05-29-84 | IN PROGRESS | 02/0911301 | 06/5041702 | GTZ | 340,963.54 | 314,300.00 | 29,239.78 | 9,045.50 |
| " | " | " | " | 32/0011000 | " | FAU | 352,585.28 | 325,023.31 | 61,396.83 | 7,297.45 |
| " | " | " | " | 33/0011000 | " | EH | 98,276.07 | 0.00 | 0.00 | 0.00 |
| 5705E | 3RD/4TH ST BR. REHAB. | 05-25-84 | IN PROGRESS | 02/0911610 | 06/5041705 | GTZ | 495,611.48 | 529,910.00 | 56,685.29 | 8,090.95 |
| 5717E | ARMY ST RESURFACING | 05-25-84 | IN PROGRESS | 02/0911225 | 06/5041717 | GTZ | 190.99 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 34/0011608 | " | PORT | 607.70 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | " | " | " | 594,686.24 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | " | " | " | 2,973.86 | 0.00 | 2,973.86 | 0.00 |

| J.O.# | JOB ORDER DESCRIPTION | START DATE | COMP DATE | SOURCE FC/F (PROJ) | OPERATING FC/F (PROJ) | SOURCE DESCRIP | EXPENDED FY 85/86 | CONTRACT COST | LABOR COST | OTHER COST |
|-------|------------------------------------|------------|-------------|--|--------------------------|--------------------------------|---|------------------|---------------|---------------|
| 5721E | VAR. LOCS. CONCRETE STS. | 06-19-84 | IN PROGRESS | 02/0911229 02/0911230 02/0911233 02/0911237 01/0011321 | 06/5041721 | GTZ GTZ GTZ GTZ GF | 113,620.47 108,811.01 67,004.35 75,246.17 13,139.18 | | | |
| | | | | | TOTAL | | 377,821.18 | 345,200.00 | 28,621.18 | 0.00 |
| 5804E | 16TH & STONEMAN RECONSTRUCTION | 11-09-84 | 03-27-86 | 02/0911228 02/0911229 02/0911225 | 06/5041804 | GTZ GTZ GTZ | 71,451.01 50,508.97 0.00 | | | |
| | | | | | TOTAL | | 121,959.98 | 108,365.35 | 13,594.63 | 86.91 |
| 5810E | GUERRERO 18TH-28TH (CMP) | 11-20-84 | IN PROGRESS | 01/0011321 | 01/0011321 | GF | 1,312.77 | 0.00 | 1,312.77 | 0.00 |
| 5826E | LEAVENWORTH TURK-GOLDEN GATE (CMP) | 01-30-85 | IN PROGRESS | 01/0011321 | 06/5041826 | GF | 27,495.79 | 25,479.00 | 2,016.79 | 0.00 |
| 5853E | 3RD/5TH/11TH (FA-14) | 04-16-85 | IN PROGRESS | 02/0911301 01/0011321 02/4501300 | 06/5041853 | GTZ GF GF | 10,118.62 0.00 0.00 | | | |
| | | | | | TOTAL | | 10,118.62 | 0.00 | 10,118.62 | 0.00 |
| 5854E | VERMONT/17TH (FA-15) | 04-16-85 | IN PROGRESS | 02/0911301 01/0011321 02/4501300 | 06/5041854 | GTZ GF GF | 5,490.10 1,548.52 0.00 | | | |
| | | | | | TOTAL | | 7,038.62 | 0.00 | 7,038.62 | 0.00 |
| 5855E | PORTOLA DRIVE (FA-16) | 04-16-85 | IN PROGRESS | 02/0911301 06/5041855 | 06/5041855 | GTZ FAU | 79,782.99 357,652.33 | | | |
| | | | | | TOTAL | | 437,435.32 | 373,750.00 | 42,205.50 | 21,479.82 |
| 5856E | CLIPPER/MARKET (FA-17) | 04-16-85 | IN PROGRESS | 02/0911301 01/0011321 02/4501300 06/5041856 | 06/5041856 | GTZ GF GF FAU | 11,652.50 2,776.03 37,500.27 234,635.22 | | | |
| | | | | | TOTAL | | 286,564.02 | 264,480.00 | 22,084.02 | 0.00 |
| 5857E | WINSTON DRIVE (FA-18) | 04-16-85 | IN PROGRESS | 02/0911301 02/0911244 06/5041857 | 06/5041857 | GTZ GTZ FAU | 49,657.40 0.00 151,743.49 | | | |
| | | | | | TOTAL | | 201,400.89 | 157,750.00 | 35,874.12 | 7,776.77 |
| 5858E | TOWNSEND ST (FA-19) | 04-16-85 | IN PROGRESS | 02/0911301 01/0011321 02/4501300 | 06/5041858 | GTZ GF GF | 22,572.83 0.00 0.00 | | | |
| | | | | | TOTAL | | 22,572.83 | 0.00 | 22,572.83 | 0.00 |
| 5859E | LAGUNA HONDA/7TH AVE (FA-20) | 04-16-85 | IN PROGRESS | 02/0911301 01/0011321 02/4501300 06/5041859 | 06/5041859 | GTZ GF GF FAU | 17,679.86 5,859.70 48,998.48 306,578.31 | | | |
| | | | | | TOTAL | | 379,116.35 | 338,770.00 | 39,033.14 | 1,313.21 |
| 5873E | LANTON/NORIEGA (FA-21) | 06-10-85 | IN PROGRESS | 02/0911301 01/0011321 02/4501300 | 06/5041873 | GTZ GF GF | 9,516.80 13,571.70 0.00 | | | |
| | | | | | TOTAL | | 23,088.50 | 0.00 | 23,088.50 | 0.00 |
| 5874E | LAKE MERCED BLVD. (FA-22) | 06-10-85 | IN PROGRESS | 02/0911301 | 06/5041874 | GTZ | 2,383.44 | 0.00 | 2,383.44 | 0.00 |
| 5875E | SUTTER/2ND (FA-23) | 06-10-85 | IN PROGRESS | 02/0911301 02/0921302 02/4501300 | 06/5041875 | GTZ GF GF | 2,246.66 0.00 0.00 | | | |
| | | | | | TOTAL | | 2,246.66 | 0.00 | 2,246.66 | 0.00 |
| 5876E | PERSIA ST (FA-24) | 06-10-85 | IN PROGRESS | 02/0911301 02/0921302 02/4501300 | 06/5041876 | GTZ GF GF | 4,150.95 0.00 0.00 | | | |
| | | | | | TOTAL | | 4,150.95 | 0.00 | 4,150.95 | 0.00 |

| J.O.# | JOB ORDER DESCRIPTION | START DATE | COMP DATE | SOURCE FG/F PROJ | OPERATING PG/F PROJ | SOURCE DESCR | EXPENSE FY 85/86 | CONTRACT COST | LABOR COST | OTHER COST |
|-------|---------------------------------|------------|-------------|---------------------|--------------------------------------|-----------------|---------------------|------------------|---------------|---------------|
| 5877E | HARNEY/ECT. (FA-25) | 06-10-85 | IN PROGRESS | 02/091:301 | 06/504:877 | GTI | 1,166.29 | 0.00 | 1,166.29 | 0.00 |
| 5878E | LACUNA ST (FA-26) | 06-10-85 | IN PROGRESS | 02/091:301 | 06/504:878 | GTI | 10,000.00 | | | |
| " | " | " | " | 01/001:321 | " | GF | 405.57 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 0.00 | | | |
| " | " | " | " | " | TOTAL | | 10,405.57 | 0.00 | 10,405.57 | 0.00 |
| 5879E | BALBOA ST (FA-27) | 06-10-85 | IN PROGRESS | 02/091:301 | 06/504:879 | GTI | 722.74 | 0.00 | 722.72 | 0.00 |
| 5880E | HAYES/CASTRO (FA-28) | 06-10-85 | IN PROGRESS | 02/091:301 | 06/504:880 | GTI | 10,000.00 | | | |
| " | " | " | " | 01/001:321 | " | GF | 2,719.88 | | | |
| " | " | " | " | 02/092:302 | " | RF | 8,112.60 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 0.00 | | | |
| " | " | " | " | " | TOTAL | | 20,832.48 | 0.00 | 20,832.48 | 0.00 |
| 5888E | LINCOLN & OTHERS (SR-1) | 11-29-85 | IN PROGRESS | 01/001:321 | 06/503:988 | GF | 55,191.60 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 1,183,780.28 | | | |
| " | " | " | " | " | TOTAL | | 1,238,971.88 | 1,125,600.00 | 98,404.07 | 14,967.81 |
| 5889E | LARKIN & OTHERS (SR-2) | 11-29-85 | IN PROGRESS | 01/001:321 | 06/503:989 | GF | 22,458.00 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 660,689.30 | | | |
| " | " | " | " | " | TOTAL | | 683,147.30 | 595,175.00 | 85,769.91 | 2,202.39 |
| 5900E | JACKSON & OTHERS STS (SR-3) | 11-29-85 | IN PROGRESS | 01/001:321 | 06/503:990 | GF | 20,633.64 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 402,640.95 | | | |
| " | " | " | " | " | TOTAL | | 423,274.59 | 341,640.00 | 75,679.82 | 5,954.77 |
| 5991E | CONCRETE STS-VAR LOCS (SR-4) | 11-21-85 | IN PROGRESS | 01/001:321 | 06/503:991 | GF | 34,856.81 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 99,981.98 | | | |
| " | " | " | " | " | TOTAL | | 134,840.79 | 0.00 | 134,840.79 | 0.00 |
| 5992E | SO. VAN NESS & OTHERS (SR-5) | 11-21-85 | IN PROGRESS | 01/001:321 | 06/503:992 | GF | 11,284.41 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 32,365.95 | | | |
| " | " | " | " | " | TOTAL | | 43,650.36 | 0.00 | 43,650.36 | 0.00 |
| 5993E | NOE & OTHERS (SR-6) | 11-21-85 | IN PROGRESS | 01/001:321 | 06/503:993 | GF | 8,355.89 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 23,966.37 | | | |
| " | " | " | " | " | TOTAL | | 32,322.26 | 0.00 | 32,322.26 | 0.00 |
| 6017E | EVANS, 3RD-NEWMALL RESURF (CMP) | 01-21-86 | IN PROGRESS | 01/001:321 | 01/001:321 | GF | 0.00 | 0.00 | 0.00 | 0.00 |
| 6031E | STREET REHAB SR-7 | 06-09-86 | IN PROGRESS | 01/001:321 | 06/503:031 | GF | 80.85 | | | |
| " | " | " | " | 02/450:300 | " | SB300 | 231.89 | | | |
| " | " | " | " | " | TOTAL | | 312.74 | 0.00 | 312.74 | 0.00 |
| 6032E | STREET REHAB SR-8 | 06-09-86 | IN PROGRESS | 01/001:321 | 06/503:032 | GF | 20.21 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | 02/450:300 | " | SB300 | 57.97 | 0.00 | 0.00 | 0.00 |
| " | " | " | " | " | TOTAL | | 78.18 | 0.00 | 78.18 | 0.00 |
| " | " | " | " | " | FAU | | 2,276,913.38 | | | |
| " | " | " | " | " | GF | | 1,654,649.07 | | | |
| " | " | " | " | " | GTI | | 1,370,833.56 | | | |
| " | " | " | " | " | RF | | 8,112.60 | | | |
| " | " | " | " | " | SE/EE | | 3,440.87 | | | |
| " | " | " | " | " | NSB300 | | 5,313,949.48 | | | |
| " | " | " | " | " | SB300 | | 2,831,176.98 | | | |
| " | " | " | " | " | TOTAL | | 8,145,126.46 | 6,856,811.80 | 1,160,302.81 | 128,011.85 |
| " | " | " | " | " | ADD FY 86-87 WK BILL FOR 85-86 CHGS | | 44,812.96 | 0.00 | 0.00 | 44,812.96 |
| " | " | " | " | " | LESS FY EXP-WK BILLING CHGD IN 85-86 | | -12,695.53 | 0.00 | 0.00 | -12,695.53 |
| " | " | " | " | " | LESS ADJUST FOR UNEMPLOYMENT INSUR. | | -2,359.49 | 0.00 | 0.00 | -2,359.49 |
| " | " | " | " | " | TOTAL ST RECONSTRUCTION AFT ADJUST | | 8,174,884.40 | 6,856,811.80 | 1,157,943.32 | 160,129.28 |
| " | " | " | " | " | LESS ADMINISTRATIVE COST (OH) | | -323,159.79 | 0.00 | -300,062.40 | -23,097.39 |
| " | " | " | " | " | TOTAL ST RECONSTRUCTION EXCL (OH) | | 7,851,724.61 | 6,856,811.80 | 857,880.92 | 137,031.89 |
| | | | | | | | | | | 0.00 |

* - Adjustments of various work billings for FY 84-85 expenditures billed in FY 85-86 and for FY 85-86 expenditures billed in FY 86-87.

* - Adjustment made by Controller's Office for surplus in Unemployment Insurance Fund. See Schedule B - Details for Unemployment Insurance Adjustment

* - The following adjustments are not included in type of funds breakdown. Cost distribution requires detailed analysis.



